

In the Specification

Please replace the paragraph beginning on page 1, line 5 after the "Related Applications" heading with the following amended paragraph:

This application is a continuation-in part of US patent application serial no. 09/792,414, filed February 23, 2001, which issued as U.S. Patent No. 6,611,002, and entitled "Gallium Nitride Material Devices and Methods Including Backside Vias," the disclosure of which is incorporated herein by reference.

Please replace the paragraph beginning on page 8, line 25 with the following amended paragraph:

The composition of transition layer 15 depends, at least in part, upon the type of substrate and the composition of gallium nitride material device region 14. In some embodiments which utilize a silicon substrate, transition layer 15 may preferably comprise a compositionally-graded transition layer having a composition that is varied across at least a portion of the layer. Suitable compositionally-graded transition layers, for example, have been described in ~~co-pending~~, commonly-owned, ~~U.S. Patent Application Serial No. 09/736,972~~ U.S. Patent No. 6,649,287, entitled "Gallium Nitride Materials and Methods," filed on December 14, 2000, which is incorporated herein by reference.

Please replace the paragraph beginning on page 9, line 9 with the following amended paragraph:

In other embodiments, transition layer 15 has a constant (i.e., non-varying) composition across its thickness. Such layers may be referred to as buffer layers and/or intermediate layers. Suitable intermediate layers, for example, have been described in ~~U.S. Patent Application Serial No. 09/736,972~~ U.S. Patent No. 6,649,287, referenced above. In some embodiments, transition layer 15 has a constant composition of a gallium nitride alloy (such as $\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{N}$, $\text{Al}_x\text{Ga}_{(1-x)}\text{N}$, or $\text{In}_y\text{Ga}_{(1-y)}\text{N}$), aluminum nitride, or an aluminum nitride alloy.

Please replace the paragraph beginning on page 13, line 15 with the following amended paragraph:

As used herein, the phrase "gallium nitride material" refers to gallium nitride (GaN) and any of its alloys, such as aluminum gallium nitride ($\text{Al}_x\text{Ga}_{(1-x)}\text{N}$), indium gallium nitride ($\text{In}_y\text{Ga}_{(1-y)}\text{N}$), aluminum indium gallium nitride ($\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{N}$), gallium arsenide phosphoride nitride ($\text{GaAs}_a\text{P}_b\text{N}_{(1-a-b)}$), aluminum indium gallium arsenide phosphoride nitride ($\text{Al}_x\text{In}_y\text{Ga}_{(1-x-y)}\text{As}_a\text{P}_b\text{N}_{(1-a-b)}$), amongst others. Typically, when present, arsenic and/or phosphorous are at low concentrations (i.e., less than 5 weight percent). In certain preferred embodiments, the gallium nitride material has a high concentration of gallium and includes little or no amounts of aluminum and/or indium. In high gallium concentration embodiments, the sum of $(x + y)$ may be less than 0.4, less than 0.2, less than 0.1, or even less. In some cases, it is preferable for the gallium nitride material layer to have a composition of GaN (i.e., $x + y = 0$). Gallium nitride materials may be doped n-type or p-type, or may be intrinsic. Suitable gallium nitride materials have been described in ~~U.S. Patent Application Serial No. 09/736,972~~ U.S. Patent No. 6,649,287, incorporated herein.

Please replace the paragraph beginning on page 13, line 29 with the following amended paragraph:

Gallium nitride material region 14 is of high enough quality so as to permit the formation of devices therein. Preferably, gallium nitride material region 14 has a low crack level and a low defect level. As described above, transition layer 15 may reduce crack and/or defect formation. In some embodiments, gallium nitride material region 14 has about 10^9 defects/cm². Gallium nitride materials having low crack levels have been described in ~~U.S. Patent Application Serial No. 09/736,972~~ U.S. Patent No. 6,649,287, referenced above. In some cases, gallium nitride material region 14 has a crack level of less than $0.005 \mu\text{m}/\mu\text{m}^2$. In some cases, gallium nitride material has a very low crack level of less than $0.001 \mu\text{m}/\mu\text{m}^2$. In certain cases, it may be preferable for gallium nitride material region 14 to be substantially crack-free as defined by a crack level of less than $0.0001 \mu\text{m}/\mu\text{m}^2$.

Please replace the paragraph beginning on page 15, line 16 with the following amended paragraph:

Device 10 may be formed using known processing techniques. Transition layer 15 and gallium nitride material device region 14 may be deposited on substrate 12, for example, using metalorganic chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE), and hydride vapor phase epitaxy (HVPE), amongst other techniques. In some cases, an MOCVD process may be preferred. A suitable MOCVD process to form a compositionally-graded transition layer 15 and gallium nitride material device region 14 over a silicon substrate 12 has been described in ~~U.S. Patent Application Serial No. 09/736,972~~ U.S. Patent No. 6,649,287, referenced above. When gallium nitride material device region 14 has different layers, in some cases it is preferable to use a single deposition step (e.g., an MOCVD step) to form the entire device region 14. When using the single deposition step, the processing parameters are suitably changed at the appropriate time to form the different layers. In certain preferred cases, a single growth step may be used to form transition layer 15 and gallium nitride material device region 14.